

**”Young age“ in L2 acquisition:
The age issue in reverse in phonology**

Henning Wode

English Department and
Center for Bilingualism and L anguage Contact
Kiel University

Olshausenstrasse 40
24098 Kiel/Germany

Phone: xx49-(0)431/880-2245

Fax: xx49-(0)431/880-1512

e-mail: officeling@anglistik.uni-kiel.de

Kiel, October 2001

Draft: Comments welcome.

Expanded version of paper given at the EUROSLA Conference 1999, Lund.

"Young age" in L2 acquisition: The age issue in reverse in phonology

Abstract

It is suggested that in order to understand L2 phonological acquisition as an integral part of the structure and functioning of sound systems it is necessary to complement the traditional approach to the age issue by including young learners to determine when and how the various phonological mechanisms become operative. This paper first deplores the lack of appropriate empirical data for children aged 4;0-5;0 and younger. Then attention is drawn to bilingual preschools for 3 year-olds to provide for such subjects. Next is a summary on a pilot survey of L2 phonological acquisition with such children in order to illustrate which issues can be raised with them. They instance, basically, the same kind of developmental structures, including transfer, as found with older learners suggesting that the phonological mechanisms, such as equivalence classification, perceptual constancy, perceptuo-motor links, and transfer, are fully in place by age 3;0. One conclusion, therefore, is that younger age ranges need to be looked at in order to understand the ontogeny of the functioning of sound systems.

1. Purpose

The age issue has traditionally been considered from the point of view of whether there is a cut-off point after which the development of a native-like accent for phonology is no longer possible. This perspective has led to the various notions of critical and/or sensitive periods associated with puberty or other age ranges (e.g. Lenneberg 1967, Seliger 1978, Scovel 1988, Long 1990. See Piske et al. 2001 for a recent survey. As repeatedly pointed out by various researchers, such attempts have, so far, not been successful (e.g. Flege 1987, Singleton 1989, Wode 1988/93, 1994a, Friederici 1996). In fact, Flege 1987 argues that age effects in language acquisition need to be conceived of in such a way, that they do exist but that there do not have to be critical/sensitive periods.

One particularly revealing case of how the previous attempts to explain the supposed age effects are at miss is speech perception with neonates and infants

before the onset of speech. This research shows that infants develop the perceptual categories of their ambient language(s) by the end of their first year of life, i.e. much earlier than puberty or any of the other time spans that have been suggested to be sensitive or critical (overview Wode 1994a). Obviously, in order to understand L2 phonological acquisition it is necessary to explore the age effects with respect to both ends of the age dimension, i.e. "young age" as well as "old age". It will be suggested that, there is a gap in the acquisition literature with respect to "young age", because there do not seem to be any L2 studies, cross-sectional or longitudinal, that cover the time span between birth and, say, 4;0-5;0. In fact, studies on young children, in general, are still rare. Note that this gap in the literature relates to production as well as perception, although in different ways (details below). Consequently, the current attempts to teach foreign languages at preschool age ranges, i.e. around 3;0-6;0, hold great promise with respect to providing subjects for the age range of 4;0-5;0 or younger, although the reasons for setting up such preschools relate to recent political, economic, and cultural developments in Europe to promote bilingualism/multilingualism. (See Wode 1992, 1995b, 1998a of these arguments¹).

To start with, we first need to clarify the theoretical assumptions underlying the present study, namely, the universal theory of language acquisition (UTA) and perception-based phonology (PBP). However, before we can turn to these issues, we need to point out some peculiarities of the bilingual preschools from which the subjects for this study are drawn. This will lead to the identification of certain issues which will then be discussed on the basis of recent data from these two bilingual preschools.

2. Some points of methodology: Bilingual preschools, data collection, research issues

The term *preschool* is here used as a cover term for any kind of institutionalized education before entry into primary school, e.g. *école maternelle* in France, *Kindergarten* or *Kindertagesstätte* in Germany, *preschool* in the United Kingdom, *kindergarten* in Canada, etc. (Wode 1998b, 2000a-c). These institutions are part of the overall education system in any country. What needs to be done to ensure the acquisition of an additional language is to organize these preschools in such a way that they operate through the medium of two

languages, namely, the children's L1 or family language plus the new language. Two such preschools have recently been set up in Northern Germany, namely, one in Rostock and the other one near Kiel. The Rostock preschool caters for German, French and English; the one at Kiel for English and German.

Access to L2: Immersion

It is crucial for understanding the nature of L2 development in such preschools to be aware of the way in which input is made available to the children. Access to the new language is provided via the two teachers. They follow the language-person bond. Teacher A uses the children's native or dominant language, B the non-native one. Teacher B needs to have some competence in the children's native language so that they can approach B on the basis of their strong language. However, when interacting with the children teacher B only uses the non-native or non-dominant language. (See Wode 2000c for details).

The amount of L2 input the children get is difficult or impossible to quantify because of the way the two preschools function. In Rostock the bilingual groups are kept pretty much to themselves with few, if any, opportunities for children from the other, i.e. monolingual groups to interact with the bilingual groups. In the Kiel preschool the children are free to roam from group to group so that the children in the bilingual groups can visit with the non-bilingual groups and vice versa.

There are no restrictions as to the use of the non-native language, except that it is done according to immersion principles. That is, the non-native language serves as the vehicular language for as many activities/interactions as possible. Moreover, the teachers are careful to use the new language in highly contextualized ways. (For more details see Wode 1997a, 2000c, Westphal 1998, Berger 1999, Tiefenthal 1999, Maibaum 2000).

Preschool research issues

There are two major lines of research relating to these preschools. One is concerned with applied issues, such as: Does the children's L1 suffer? What is the effect on the cognitive development of the children, in particular, are there any negative effects? How does the new language develop? How do the teachers have to use the new language so that the children can learn it on their own? (For some results on these issues see Rohde 1999, Rohde 2000, Berger 1999, Rohde/Tiefenthal 2000, Tiefenthal 1999, Westphal 1998).

The second line of research relates to theory, the key question being: How and to what extent can the study of these preschoolers advance our understanding of L2 acquisition? As will become apparent below, such preschools constitute a rich data source for investigating issues that are difficult or impossible to pursue elsewhere because of lack of appropriate subjects. In particular, the rate of L2 learning with these preschoolers is slow, probably because the amount of input is anything but overwhelming. Moreover, the children are not pressured to use the L2 or to join in on any of the L2 based activities. They are free to do so, but they can always turn to something else conducted in their L1. Their daily intake, therefore, is probably not very high. Furthermore, it almost goes without saying that the children are not likely to use the L2 among themselves since they all know German much better. Consequently, there is very little L2 output. (See Wode 2000c for details).

On the other hand, there will be an increasing supply of such children for many years which allows for the kind of research designs that require large numbers of subjects, long periods of observation, or series of experiments extending over a longer period of time.

Dimensions of comparison

In order to determine the nature of L2 development during preschool age ranges two kinds of comparisons are of particular importance. First, whether L2 phonological acquisition in preschool is any different from other kinds of L2 acquisition in terms of the acquisitional process; and, second, whether there are any differences correlating with age. Both dimensions can be addressed by comparing the preschool data with the evidence for the four naturalistic child L2 learners of English of the Kiel corpus. Their L1 is German, and their age range was 3;11-8;11 upon first contact with English. Moreover, it has already

been shown that their L2 phonological peculiarities parallel those of older learners both from tutored and non-tutored learning situations (Wode 1981).

Data collection

The language situation in these preschools is such that the children, in general, tend not to use their L2 spontaneously among themselves, because, in general, there is only the teacher who does not speak it. This does not mean that they do not have any knowledge of the L2 at all. They certainly do. This becomes evident, for example, when they teach the L2 to their younger brothers or sisters at home, or when they comment about the L2, as in the following anecdote (1) from the Kiel preschool (Tiefenthal 1999):

- (1) One boy is confiding to another one how to handle teacher B, a native speaker of American English called Tracy:

Child: *Tracy* will immer, daß wir *Tracy, tie my shoes, please* sagen. Aber ich mach das nie.

(Tracy always wants us to say *Tracy tie my shoes, please*. But I never say that)

Obviously, the children do learn a lot of L2, but their competence needs to be tapped. To do that we rely on elicitation procedures that involve identifying objects on picture cards, labeling objects pictured on such cards, and we also ask the children to help out as interpreters in puppet shows where the characters act out various situations familiar from the children's everyday experience in their preschool. For example, there may be two hand puppets. One is a newcomer to the preschool, the other one is not. The child is asked to take the part of the experienced puppet. Some teacher will then give some directions in the L2. The newcomer is to ask the other puppet what these directions mean. The experienced puppet/child then explains the situation thereby showing in which way s/he interprets, i.e. semanticizes what was said. The same procedure can be used to elicit L2 production by suggesting that a non-German-speaking puppet is on visit in the preschool. Directions are then given in German so that the non-German speaking child can ask to have it translated into the L2. (For more details on these procedures see Westphal 1998, Berger 1999, Tiefenthal 1999, Maibaum 2000).

3. The theoretical framework: UTA and PBP

As for the theoretical approach to language acquisition in general, and to phonological acquisition in particular, the research not only on the preschools is based on the universal theory of language acquisition (UTA) in conjunction with perception-based phonology (PBP). The universal approach requires all acquisitional types and the entire age range to be included. As for phonological theory in general, PBP integrates perception and production. In fact, I have argued elsewhere, that since a number of basic theoretical constructs of phonological theory, notably, phonemes and the typology of distinctive features, have their origin in perception rather than in production, any approach to the structure and functioning of sound systems should primarily be based on perception (e.g. Wode 1990, 1994b, 1995a, 1997b, c).

From the point of view of UTA and PBP, it is important to be aware of the fact that the study of L2 acquisition cannot be limited to the development of the phonological inventory in terms of features, phonemes, or syllables. We also need to include, and focus on, the mechanisms that give rise to these units, notably categorical perception, (e.g. Eimas al 1971, Jusczyk 1997), perceptual constancy (e.g. Kuhl 1976, Kuhl/Miller 1982, Jusczyk et al. 1992), equivalence classification (e.g. Wode 1981, Flege 1995, perpeptuo-motor links, or the anatomical and functional development of the vocal tract (e.g. Liebermann 1975, 1984, Kent 1992). These mechanisms need to be in place before the correlates of phonemes, features, etc. can emerge, irrespective of whether a given child is growing up as a L1 monolingual or L2 bilingual speaker.

Moreover, although the key assumption for PBP is that perception precedes production, the relationship between the two is anything but simple. For one thing, there may be substantial temporal discrepancies between the two. A particularly conspicuous gap concerns the pre-voiced aspirated stops, as in Hindi. Although children discriminate them perceptually before the onset of production, i.e. before the children produce their first word(s), it tends to take six to seven years before L1 Hindi-speaking children can control their articulatory gestures to produce such sounds in a consistent way (Davis 1992. See also Gandour et al. 1986 for Thai. See Wode 1999 for a survey). Such observations show that, although both perception and production are required for sound systems, they need not develop in unison.

All in all, it appears that PBP and UTA, if taken together, force us to raise a number of issues that, to my knowledge, have not been identified so far with respect to “young age“. What, for example, is L2 acquisition like if a child is exposed to another language at a point in time prior to 4;0, say at 1;0, 1;5, or 2;7? That is, what will a child's attempts at production be like, if her/his L1 coding in production is still based on articulatory patterns such as described in detail in Piske 2001? Will these L1 patterns transfer to the L2? Will L1 harmony or any of the other phonological processes so familiar from L1 research (overview Vihman 1996) transfer to the L2? Does perception and production transfer conjointly or are there discrepancies comparable to L1 acquisition? And what are the implications for theory?

The line of argument I wish to follow in this paper is to review the preschool data as to their implications with respect to such theoretical issues. Of course, 3-year olds are beyond the stage of articulatory patterns and/or heavy reliance on such early phonological processes as harmony, stopping, and so forth. But their data shed new light on the nature of some of the mechanisms underlying phonological development, notably, equivalence classification. This issue, therefore, will be the focus in this paper.

4. The age gap in L2 acquisition research

The research gap concerns the age range younger than 4;0-5;0. This is true for perception as well as production, although in different ways. As for production, I am not aware of any detailed studies, longitudinal or other, of children under four years of age and that can be used to approach the issues raised in this paper. In fact, the youngest child in our data base at Kiel was 3;11 when first exposed to English as her L2. In addition, we also had a brief look at a boy with English as his L1 and who began to learn German as his L2 at the age of 2;8. Unfortunately, we were not able to do a thorough study of this child and we only met him at the age of 3;2. My impression then was that at this age the child was already producing the kind of L2 peculiarities, including transfer, familiar from older L2 learners of German, such as adolescents and adults. Of course, such issues need to be looked at in more detail; and the preschoolers do, indeed, provide some additional evidence although limited to the age range starting at 3;0 and restricted to production.

Perception

There are no detailed studies that focus on the acquisition and development of L1 and/or L2 perception in 1-, 2-, or 3-year olds.² The recent research on whether monolingual L1 children can discriminate non-native sound contrasts is helpful with respect to the beginnings of L2 acquisition. This research shows that there are changes in the perceptual behavior of monolingual children. By the end of their first year of life they have become particularly sensitive to the sound contrasts used in their native language. That is, their perceptual categories are much the same as those of older children, adolescents, or adults. As for non-native sound contrasts there are some that children fail to discriminate towards the end of their first year of life; whereas other non-native contrasts continue to be discriminated well into adulthood (e.g. Best 1994, Best et al. 1988, Werker et al. 1981, Werker/Tees 1984a, b.). Moreover, the development of target language vowels sets in earlier than with the consonants (Kuhl 1992. See Wode 1999 for a survey).

Note that the evidence for perception is anything but complete. But what there is can be made use of to better understand, e.g. equivalence classification. Note that just like more mature speakers/learners infants need to be credited with such a mechanism if they can be shown to react categorically to a range of stimuli that represent an acoustic continuum. To be able to do so, infants have to be able to determine how closely a given stimulus resembles others. This also applies to non-native sounds, namely, whether they resemble any of the L1 categories already at the child's disposal. If the L2 sound is found to be close enough it will be mapped onto the L1 category. In those cases where the L2 sound is not similar enough to any of the infant's L1 categories the former is not mapped onto any L1 category, i.e. the L2 sound is not attracted to any of the latter categories and, therefore, needs to be processed in another way. (See Wode 1981, Best 1994, Flege 1995 for slightly different approaches along these lines). It is evidence like the above that allows us to suggest that equivalence classification is probably available at birth, but certainly by the end of the first half year of life.

Production

As already pointed out, the preschool data to date are restricted to production. But even so, this material is helpful, because it allows us to readdress two topics of long standing concerning age effects in conjunction with L2 phonology. One topic is that the arguments concerning age effects have centered largely on the occurrence or non-occurrence of transfer. The second one is a distinction suggested during the late 1970s and early 1980s, but which, to my knowledge, has not been followed up on to any large extent, although it is crucial for our understanding of L2 phonological acquisition.

At that time I suggested that there were at least two perspectives to the age issue, namely, the structural issue and the proficiency issue. The former was concerned with whether there were differences in the nature of the developmental structures of L2 learners as a function of age; the second issue was whether there were differences in the achievement levels attainable by different age groups (e.g. Wode 1981). It is the second issue that tends to be at stake in claims concerning age in L2 acquisition theory (such as in Lenneberg 1967, Scovel 1988, Long 1990, Flege 1987, Piske et al. 2001). As argued in more detail in Wode 1978, 1981, 1994a, such a perspective is too narrow, because it leaves us in the dark as to why there may be age effects, what causes them, and what exactly it is that is effected by age. In Wode 1981, 1988/93. I suggested that there were no age differences with respect to the developmental sequences, but that there were such differences with respect to the proficiency levels that are attained. Since then, the research on speech perception with infants as mentioned above has produced some of the most striking evidence to justify this distinction. As detailed in Wode 1994a the reason why there is transfer does not relate to any kind of development occurring at puberty, as might be argued based on Lenneberg 1967, nor age 6, as might be argued by Long 1990. The nature of phonological transfer is based on perceptual developments occurring during the second half of the first year of life. The preschool data allow us to substantiate this argument empirically down to age 3;0 with respect to the impact of the state of development of the L1, the nature of segment-based substitutions, segment-based transfer, morphophonologically based transfer, non-transfer based substitutions, and tutored vs. non-tutored L2 acquisition.

5. Some L2 peculiarities in young learners

The overall impression is that the preschoolers' evidence is highly comparable to that of other L2 learners of the same age range or older. This can be illustrated on the basis of some of those peculiarities that are known to be characteristic of L2 acquisition. The impact of the state of development of the L1, segment-based transfer, and the acquisition of /r/ will be singled out for closer inspection. For reasons of space, other kinds of evidence will only be mentioned in passing. As was to be expected, there is a good deal of intra- and inter-individual variation.

The data will be presented in such a way that the evidence from the preschoolers is compared, primarily, to the naturalistic data of the four German children of the Kiel corpus.

The impact of the state of development of the L1

It is, of course, a truism that the nature of L2 production reflects the structure of the L1. However, it needs to be understood that such a formulation necessarily refers to the state of development of the L1 with a given speaker/learner. That is, the substitution patterns found with L2 learners reflect the state of development of their L1 phonological system, in particular, during the early stage(s) of their development. This is illustrated in Tables 1-2 which summarize some data from a German child's L1 development at age 3;11 (Table 1). She is one of the four L1 German children whose L2 phonological development has been studied intensively at Kiel (e.g. Wode 1977, 1978, 1980, 1981). At the time of first contact with English she did not yet distinguish between /s z (ʃ)ʒ/ in her L1 production; she replaced them by {ʃ ʒ}; and the final voiced obstruents of English are devoiced (Table 2). The dental nature of the fricatives was due to the fact that she had a lisp.

Table 1 about here

Table 2 about here

Moreover, the evidence from the preschoolers and the four German children aged 3;11-8;11 at the time of their first contact with English as their L2 reinforces the point concerning the impact of the state of development of the L1. There is no harmony nor any of the other processes of early L1 phonology upon first contact with a new language if the learner is past this point in his/her L1 development. Nor do children develop articulatory patterns as in the initial stages of L1 production. On the other hand, other kinds of transfer are quite conspicuous. Its structure, functioning, and, in particular, the systematicity behind its occurrence and use, appears to be the same across the entire age range after 4;0. The evidence for the preschoolers allows us to suggest that this state of affairs already applies at age 3;0.

Segment-based L2 substitutions

Segment-based substitutions are those where one sound is substituted by another one irrespective of the morphophonological context. For example, the vowel in English *twelve* may be replaced by [ø], because its German cognate *zwölf* is pronounced /tʃvølf/. English containing /E/ and that do not have morphophonologically close cognates, like *peck*, *wren*, *debt* are pronounced with [E].

Table 3 lists those English sounds that notoriously cause problems for German L2 learners/speakers. Although Table 3 summarizes the evidence for the four Kiel children. It should be noted that it has already been shown elsewhere that their evidence parallels the evidence for other age ranges and other kinds of L2 acquisitional situations (e.g. Schröder 1979, Wode 1981). The reason why the two older children HEI and BIR are included in Table 4 is to illustrate the parallelism across the age range.

Table 3 about here

Transfer-based vs. non-transfer-based substitutions

Table 3 illustrates two kinds of substitutions, namely, those that result from transfer from the L1 and those that do not. The latter comprise the substitutions

for /r/ except [ʁ]; the former all the others including the vowels and [R] as a substitute for /r/. As explained in detail in previous publications (e.g. Wode 1977, 1981), only [ʁ] substituting for English /r/ can be viewed as originating from transfer since it is very likely that BIR managed to link her German /ʁ/ to the English /r/ because she took an interest in the spelling of words like *orange*, which is spelled like its German cognate. In general, [w] is the dominating substitute for English /r/ in both L2 and L1 acquisition.³ Note that, all in all, the evidence for the four children is not identical, but it is close enough across the respective age span of 4;0-9;0 to suggest that the children follow basically the same process.

Naturalistic L2 acquisition vs. preschool

Given the obvious differences in the learning situations between fully naturalistic situations vs. preschools it needs to be checked whether preschoolers proceed differently or whether they agree with the pattern established via Table 3 for truly naturalistic situations. Therefore, Tables 4-5 contrast the evidence for preschoolers vs. naturalistic learners. Table 4 has the evidence for five children of preschool age for the transfer-based substitutions. The evidence for English /r/ is summarized in Tables 5-6.

Table 4 about here

Table 4 contrasts the evidence for five children of preschool age, two being non-preschool learners and three preschool learners. The latter three were chosen because they had been attending preschool for only half a year.

The evidence in Table 4 as well as Table 7 on inter-individual variation (considered later) reinforces the conclusion derived from Table 3, namely, that the transfer-based developmental structures are much the same across the entire age range as well as across the various L2 learning situations.

The case of Engl. /r/

The evidence for the acquisition of English /r/ is included here to indicate that the structural parallelism between the preschoolers and the four naturalistic learners also applies to those substitutions that are not due to transfer.

Previous research has shown that the retroflex /ʁ/ of American English and the frictionless continuant /ʁ̥/ of British English tend to be deleted or substituted by {w} (Wode 1977, 1981). Table 6 has the evidence for the three younger German children of the Kiel data base including the two of preschool age. The older child HEI is not included because as a fourth grader his literacy in German was too well advanced that he could well have made use of it, although, as a matter of fact, he did not do so. Table 6 lists the data for five preschoolers when asked to identify objects on picture cards.

Table 5 about here

Table 6 about here

Table 6 contains two additional rows as compared to Table 5. The evidence for /Vr/ of Table 5 is split into two subsets by listing those words that contain the final unstressed syllable *-er* in one row, and leaving the other cases of post-vocalic /r/ in another row. For both kinds of targets the preschoolers' input varied between /v̄/ and /v̄^x/ depending on the variety spoken by the carepersons/teachers. In either case both the preschoolers and the non-preschoolers used their German /â/ or /a/ as a substitute.

In addition, the target environment /VrV/ is given a separate row in Table 6, because there were a few cases of [â] and [v] substituting for the intersyllabic target /-r-/.

Individual variation

As one would expect, there is a wide range of inter- and intra-individual variation among the preschool children. Table 7 illustrates this on the basis of ten preschoolers and their productions in a picture naming task. The English targets are those that notoriously pose problems for German learners. Table 7 is structured in such a way that the substitutions per child and word are ordered according to their frequency in the use of the respective child.

Table 7 about here

The data for the preschoolers of Table 7 suggest that their range of inter- and intra-individual variation is relatively large. Moreover, their productions tend to take quite some time before they stabilize into a pattern that is both stable for the individual speaker and homogeneous across the group. This is indicated by the fact that the variability is in evidence with all the children no matter how long they may have attended the bilingual preschool. That is, even after two and a half years of contact, as in the case of child A8, their productions still do not appear fully stabilized yet. Obviously, this issue needs to be investigated in more detail on the basis of a greater number of children.

6. Discussion

Clearly, the findings presented above are consistent with the hypothesis pursued so far, namely, that L2 phonological acquisition at age 3;0 is not different from older age ranges. Of course, in the strict sense this can only be correct with respect to the acquisitional properties considered above. Note, however, that those are among the major ones that characterize L2 acquisition. Moreover, for them to be in evidence implies that others are also in place, notably, categorical perception, equivalence classification, perceptual constancy, perceptuo-motor links, the anatomical developments, and, possibly, others. One purpose of this section is to broaden the range of empirical observations.

As for transfer, the focus in Ch. 3 was on segment substitutions. In this respect the preschoolers patterned like the older learners. Of course, in order to truly establish the point that L2 acquisition at 3;0 is like during later age ranges, other transfer phenomena need to be taken account of as well. Consider, for

example, transfer of syllable structure processes such as final devoicing of obstruents, glottal stop insertion, or de-velarization of syllable final /-l/. Although not presented in detail above, this type of evidence supports the above claim. Preschoolers, just like the non-preschoolers, devoice syllable final voiced obstruents; they almost regularly insert a glottal stop before syllable initial vowels, and their syllable final /-l/s tend to be de-velarized. Moreover, the evidence for morphophonologically based transfer appears to be parallel for both groups of learners. Examples from the preschoolers include *banana*, *orange*, *apple*, or *twelve*.

Whereas the transfer evidence indicates that the underlying mechanisms are fully in place by 3;0 the evidence for non-transfer based regularities needs to be viewed with some caution, because of gaps in the empirical evidence. This warning also pertains to the [w] substitute for English /r/. On the one hand, the evidence for both types of children, i.e. the four naturalistic learners and the preschoolers proper, was very clear and straight forward. [w] was their dominant substitute, but there were occasional occurrences of [ʁ] which were reminiscent of transfer from German. In BIR's case the source for her use of [ʁ] could be traced to transfer from German due to orthography. Whether any of the preschoolers' [ʁ]s in Tables 6 and 7 are due to orthography cannot be decided, although this possibility should not be ruled out a priori, given the fact that parents read stories to their children and/or even introduce their little ones to writing before they begin to go to school.

The major difficulty, however, is the evidence for English /r/ with school-age children and adults. The kind of evidence that is required is simply not available. What is needed are studies on naturalistic, i.e. non-tutored L2 acquisition of English /r/ by such learners. They should be next to impossible to find, because of the impact of education and literacy world wide. As highlighted by BIR's evidence, literacy provokes phonological transfer. It is quite telling, therefore, that in a very detailed study of a class of 10-11-year olds at the end of their first year of English instruction Schröder 1979 found that the children used both [ʁ] and [w]. Note that these children were taught in the traditional way, i.e. language-as-subject, and not according to immersion principles. Therefore, the occurrence of {ʁ} is no surprise in light of BIR's evidence. The surprise is the occurrence of {w} inspite of the emphasis on reading and writing in this kind of foreign language teaching from the very beginning.

So far the dominant impression with respect to the data discussed in the previous chapters has been that there are no major differences in L2 phonological acquisition between preschoolers and non-preschoolers. However, the evidence of [w] substituting for /r/ aside, there are a few residual examples from the preschoolers that are reminiscent of the evidence that is usually cited in support of child L1 phonological processes, such as harmony, fronting, etc. (Table 8).

Table 8 about here

At the present time, it is difficult to decide what to make of the data of Table 8. On the one hand, recall that, no such utterances are on record for the four German children of the Kiel corpus. One option, therefore, might be to assume that such instances are, truly, cases of early L1 phonological processes. In this case they might be regarded as residues of earlier developments and which children, in general, tend to have outgrown by age 3;0.

On the other hand, cases as in Table 9 could simply be regarded as ordinary slips of the tongue. One difficulty with this view is that such slips are not recorded for the four naturalistic German L2 learners. It seems that, unfortunately, the acquisitional status of such data cannot be fully assessed at the present time. What is urgently needed is longitudinal L2 studies starting before 3;0 and encompassing the age range up to 5;0.

7. Conclusions

The data above may provide little or no empirical, i.e. data-driven, motivation to go beyond 4;0 or to make special provisions within our theoretical framework for early L2 learners. But can we leave it at that? Obviously not, for several reasons.

First, L1 bilingual children have, so far, not been reported to rely on phonological transfer during their early stages of development (see such classic studies as Leopold 1939, Ronjat 1913. For the theoretical point see Wode 1995b). Why would this be so, and what are the mechanisms that make L1 bilingual children procede in this way?

Second, the data of Table 9, reminiscent as they are of early L1 acquisition, need to be followed up on. After all, the evidence for speech perception suggests that children can detect their native language categories before the onset of production so that L1 phonological processes result in mismatches between the target, its perception by the infant/child, and the latter's production. How will a new language fit into this? And if there is to be transfer, which aspect/component will transfer -- the entire complex, perception only, production only? Obviously, the pursuit of such issues promises insights into the interaction of the various processing components required for phonology in a way not available elsewhere.

Moreover, although the two points above relate to uncertainties, two other points can be taken for settled. One is that we need further research on L2 acquisition before 3;0. The other one is that it will no longer do to arbitrarily lay down 3;0 as the point that separates L1 from L2 acquisition as proposed by McLaughlin 1985. For one thing, the perceptual evidence on neonates and infants before the onset of speech clearly antedates 3:0. More importantly, we need to explore the emergence of the differences between L2 acquisition and the other acquisitional types in terms of developmental structures on the basis of empirical evidence.

Notes

1. It is increasingly being recognized that additional languages need to be introduced much earlier, preferably before the children enter primary school. This, of course, requires that teachers be trained for such jobs. Amongst other things, they have to know what kind of L2 competence to expect from students who have attended a bilingual preschool in order to be able to continue teaching the L2 at the level the students have reached instead of treating them as novices. (For details on the educational aspects of bilingual preschools see Wode 1998b, 2000a-c).

2. The reason is that children between 1;0-4;0 do not comply with the presently available research techniques of HAS (high amplitude sucking) or HAT (head turn technique). These children are too unruly.

3. In fact, eventually BIR also developed the target-like /r/. Her developmental sequence, however, is interesting from the point of view of this paper. She did not go straight from { . } to { ö }, but after { . } she reverted to { w } and then she developed { ö } .

Table 1: IG's use of {Q D} in her L1 development (from Wode 1981).

L1 target	Child L1	L1 item	L1 target	child L1
/S/	Q	schön	Søn	QØn
/J/	D	Garage	garAJ´	RAD´
/z/	D	soll	zÅl	DÅl
/s/	Q	weiß	va!s	va!Q

Table 2: IG's early L2 use of {Q} (from Wode 1981).

L2 target	Child L2	L2 item	child L2	time of exposure
/ (d)ʃ /	D	Johnny	Dʌni	0;4
		Ginger	D!nDa	0;9
		Ginger	DEnDo	0;12
/s/	Q	yes	jEQ	0;18
		sit	Q!t	1;0
		soul	Qo1	1;7
/ (t)ʃ /	Q	much	mat ^h Q	0;27
		Shasta	QaQta	0;27
		fishing	f!Q!N	0;30
		shut up	Qatap	1;1
		English	ENiQ	1;7
/z/	Q	guys	ga!Q	1;2
		please	p ^h liQ	1;15

Table 3: Segment substitutions in L2 English for English targets that are notoriously problematic for Germans during the initial stages of L2 acquisition (based on Wode 1981). The frequency of occurrence of the variants for a given target is indicated by listing them in descending order.

L2 target	L2 substitution			
	HEI (8;11)	BIR (7;11)	LA (5;11)	IG (3,11)
Consonants				
/r/	-	,	w	w
		w		
/Q-/	Q-	s-	Q-	Q-
	s-	Q-	s-	f-
/-Q-/	-Q-	-Q-	-Q-	
	-f-			
	-s-			
/D-/	D-	d̄-	D-	d̄-
	d̄-	z-	tʃi-	
	z-			
/-D-/	-d̄-	-d̄-		
	-D-			
/w/	w	w	w	w
	v	v	v	v
				f
/v-/	v-	w-	w-	w-
	w-		v-	v-
			ʁ-	
/-v-/	-v-	-v-	-v-	-v-
	-w-		-f-	
/l/	l	l	l	l
Vowels				
/æ/	E	E	E	E
/Oø/	o	o	o	o
/E!/	e > E!	e > E!	e > E!	e > E!
/E ^r /	π	π	π	π
/v ^r /	v ^á > v [´]	v ^á > v [´]	v ^á > v [´]	v ^á > v [´]

Table 4: Segment substitutions as in Table 4 contrasting the two preschool children of Table 3 and the three youngest preschoolers. A 9 etc. = serial number for preschoolers. LA and IG had a lisp. Variants are listed according to descending frequency.

L2 target	L2 substitution				
	LA (5;11)	IG (3,11)	A 17	A 9	A 19
Consonants					
/Q-/	Q-	Q-	s	s	s
	s-	f-	ts	Q	ts
				ts	
/-Q-/	-Q-		-	-	-
/D-/	D-	d-	-	-	-
	tʃi-				
/w/	w	w	-	w	w
	v	v		v	v
		f			
/v-/	w-	w-	f	f	f
	v-	v-		v	v
	ʁ-				
/-v-/	-v-	-v-	-	-	-
	-f-				
/l/	l	l	l	l	l
Vowels					
/æ/	E	E	E	E	E
				æ	
/Oø/	o	o	o	o	o
			a		a
/E!/	e > E!	e > E!		e	
/E ^r /	π [´]	π [´]	-	-	-
/v ^r /	v [´] > v ^á	v [´] > v ^á	-	-	V ^á

Table 5: Early L2 substitutions for English /r/ by three German children learning English as their L2 in a naturalistic setting. x = such substitutions are on record but not for that particular word.

L2	target	BIR 7;11	LA 5;11	IG 3;11
/r-/	Redding ready	x wEdi	wEd!N x	wEd!N wEdi
/CrV/	Craig Trinity Center truck	k ^h wEk x t ^h wak	k ^h wE:k t ^h w!n!ti QEntå x	k ^h wE!k x x
/Vr/	hammer here	hEmå hiå	hEmå hiå	hEmå hiå

Table 6: Early L2 substitutions for English /r/ by German preschoolers. -- = not attempted. A 17, A 9 etc. = serial number for preschoolers. Variants listed according to descending frequency.

L2	target	A17/3;10	A9/4;2	A19/4;10	A6/4;11	A8/4;11
/r-/	robot red	-- wEt	-- --	-- @E:t	wÅbat wEt	-- @Et
/CrV/	green three	-- --	gwin svi tstv!	g@in Q@i	gwin svi	gwin twi t@i
/Vr/	car ears four	-- -- foå ¹	-- -- fÅ: fA: fÅå	ka: Øås fo:	ka: i'Q fO	kaø -- fO
-/V´ /	football player water	bOl --	fÅtbOlå xøtbÅlpl eå wOtå	føtbala --	føtbOl føtbOlpl eå wOtå	føtbølp eå --
/VrV/	orange cherry	-- --	-- SE,i	ÅwEnS SE,i	Åw!nS SEvi	o: !nS tSEvi

¹instead of *two*

Table 7: Inter- and intraindividual variation for 10 preschoolers for those L2 English targets that are notoriously problematic for German learners. A5, A6 etc.= serial number for preschoolers. Variants listed according to descending frequency.

L2 target	A5	A6	A8	A9	A10	A11	A13	A14	A15	A22
cons.										
/Q/	ts s	Q s t tQ ts	Q t S	s Q ts	Q ts d	Q s z	ts Q s S	t Q s	d Q s	f Q
/w/	w	w	w	w v	w v	w v	v w	w	w ®	w
/v/	f v	f v	f v	f v	f v	v f	f v	f v w	f v	f v
/l/	l	l	l	l	l	l l>	l l>	l l>	l l>	l l>
/r/	w v ,	w v	® w	v , w ®	w ® v ,	w v ® r ,	v w ® l	v w	® w R ,	w ® ,
Vowels										
/æ/	E a E:â	E	E æ	E æ	a E æ	E æ i U a	E æ	E a U	E æ	E
/ʰø/	oø oø o O	Oø o O	o	o	ø Oø o	ø o	ø oø	ø Oø	ø aø O	ø Oø O
/E!/	E e i E!	E!	E! E e i	e	E e	E! e i	E!	E! e	E! e	E!
/V ^r /	V ^â V:		V ^â	V ^â	V ^â V:		V ^â	V ^â	V ^â	V ^â

Table 8: Phonological processes reminiscent of L1 acquisition.

L1 process	L2 target	child substitution
stopping	frog	fʌt
	house	haət
	mouse	Maət
	wolf	bu:l f
	cow	t a:ə
	orange	oŋ:ŋg
	veil	bEju
cluster reduction	screwdriver	gud@!vå
nasalization	yellow	nElø
fronting	thigh	fa!
backing	a robe	'@'ət

References

- Berger, C. (1999). Pilotuntersuchungen zum Lauterwerb des Englischen in bilingualen Kindergärten am Beispiel der "roten Gruppe" in der AWO-Kindertagesstätte Altenholz. Mimeo, Kiel University.
- Best, C.T., McRoberts, G.W. & Sithole, N.M. (1988). Examination of perceptual reorganisation for nonnative speech contrasts: Zulu click discrimination by English-speaking adults and infants. *Journal of Experimental Psychology*, 14, 345-360.
- Best, C.T. (1994). The emergence of native-language phonological influences in infants: A perceptual assimilation model. In J.C. Goodman & H.C. Nusbaum (ed.), *The Development of speech perception: The transition from recognizing speech sounds to spoken words*. Cambridge, MA: MIT Press, 165-224.
- Davis, K. (1992). *Phonetic and phonological contrasts in the acquisition of voicing*. Ithaca, N.Y. Cornell University, Department of Modern Languages and Linguistics.
- Flege, J.E. (1995). Second language speech learning.: Theory, findings, and problems. W. Strange (ed.) *Speech Perception and Linguistic Experience. Issues in Cross-Language Research*. Baltimore: York Press, 233-277.
- Flege, J.E. (1987). A Critical Period for Learning to Pronounce Foreign Languages? *Applied Linguistics* 8, 162-177.
- Friederici, A.D. (1996). Neurobiologische Grundlagen sprachlicher Repräsentation. In: *Zeitschrift für Semiotik*. 18, 251-264.
- Gandour, J., Petty, S.H., Dardarananda, R., Dechongkit, S. & Munkgoen, S. (1986). The acquisition of the voicing contrast in consonants. *Journal of Child Language* 13, 561-572.
- Ingram, D. (1989). *First language acquisition: Method, description, and explanation*. Cambridge: University Press.
- Jusczyk, P.W. (1997). *The discovery of spoken language*. Cambridge, MA: MIT Press/ Bradford Books.

- Jusczyk, P.W., Pisoni, D.B. & Mullennix, J. (1992). Some consequences of stimulus variability on speech processing by 2-month old infants. *Cognition* 43, 253-291.
- Kent, R.D. (1992). The biology of phonological development. In C.A. Ferguson, L. Menn & C. Stoel-Gammon (ed.), *Phonological development: Models, research, implications*. Timonium, MD: York Press, 65-90.
- Kuhl, P.K. (1976). Speech perception in early infancy, The acquisition of speech sound categories. In S.K. Hirsh, D.H. Eldridge, I.J. Hirsh & S.R. Silverman (ed.), *Hearing and Davis: Essays honoring Hallowell Davis*. St. Louis: Washington University Press, 149-158.
- Kuhl, P.K. (1992). Speech prototypes: Studies on the nature, function, ontogeny and phylogeny of the 'centers' of speech categories. In Y. Tohkura, E. Vatikiotis-Bateson & Y. Sagisaka (ed.), *Speech perception, production and linguistic structure*. Amsterdam et al.: IOS Press, 239-264.
- Kuhl, P.K. & Meltzoff, A.N. (1995). Vocal learning in infants: Development of perceptual-motor links for speech. In *Proc. XIII Intern. Congr. Phonetic Sciences*, vol. 1. Stockholm University, 146-149.
- Kuhl, P.K. & Miller, J.D. (1982). Discrimination of auditory target dimensions in the presence or absence of variation in a second dimension by infants. *Perception and Psychophysics* 31, 279-292.
- Lasky, R.E., Syrdal-Lasky, A. & Klein, R.E. (1975). VOT discrimination by four to six and a half month old infants from Spanish environments. *Journal of Experimental Child Psychology*, 20, 215-225.
- Lenneberg, E.H. (1967). *Biological foundations of language*. New York: Wiley.
- Leopold, W.F. (1939-1949). *Speech development of a bilingual child: A linguist's record*, 4 vols. Evanstown, IL: North-Western University Press.
- Lieberman, P. (1975). *On the Origins of Language: An Introduction to the Evolution of Human Speech*. New York
- Lieberman, P. (1984). *The biology and evolution of language*. Cambridge, MA & London: Harvard University Press.
- Lieberman, P. (1998). *Eve spoke: Human language and human evolution*. New York and London: Norton & Co.
- Lindner, U. (i. prep.) *Die Rolle der Silbe und ihre Funktion im L1-Erwerb*.

- Long, M.H. (1990). Maturation constraints on language development. *Studies in Second Language Acquisition* 12, 251-285.
- Macken, M.A. (1979). The developmental reorganization of phonology: a hierarchy of basic units of acquisition. *Lingua* 49, 11-49.
- MacLaughlin, B. (1985). *Second language acquisition in childhood: School-age children*, Hillsdale, NJ: Lawrence Erlbaum.
- Maibaum, T. (2000). *Replikationsstudien zum Wortschatzerwerb in der Fremdsprache in bilingualen Kindergärten*. MA, Kiel University.
- Piske, Th. (2001). *Artikulatorische Muster im frühen Laut- und Lexikonerwerb*. Tübingen: Narr.
- Rohde, A. (1999). Early lexical development in non-tutored L2 acquisition. In: S. Foster-Cohen, M. Lambert, C. Perdue & R. Rast (ed.), *Proceedings of the 8th Eurosla Conference, vol. 2: From word to structure*. Paris: University of Paris, 49-59.
- Rohde, A. (2000) Principles and constraints in lexical acquisition. In: *Anglistentag 1999 Mainz*. Trier: Wissenschaftlicher Verlag, 465-475.
- Rohde, A. & Tiefenthal, C. (2000). Fast mapping in naturalistic L2 acquisition. *Studia Linguistica* 54, 167-174.
- Ronjat, J. (1913). *Le développement du langage observé chez un enfant bilingue*. Paris: Champion.
- Schröder, A. (1979). *Aussprachefehler bei Sextanern im Englisch-Anfangsunterricht im Lichte des natürlichen L2-Erwerbs*. Arbeitspapiere zum Spracherwerb 23, Kiel: English Department, Kiel University.
- Scovel, T. (1988). *A time to speak. A psycholinguistic inquiry into the critical period for human speech*. Cambridge, MA: Newbury House.
- Seliger, H.W. (1978). On the evolution of error type in high and low interactors. *Indian Journal of Applied Linguistics* 4, 22-30.
- Singleton, D. (1989). *Language acquisition: The age factor*. Clevedon: Multilingual Matters.
- Streeter, L.A. (1976). Language perception of 2-month old infants shows effects of both innate mechanisms and experience. *Nature* 259, 39-41.

- Tiefenthal, C. (1999). Die Entwicklung des Wortschatzes der Fremdsprache in einem deutsch-englisch bilingualen Kindergarten. M.A., Universität Kiel.
- Vihmann, M.M. (1996). Phonological development: The origins of language in the child. Cambridge, MA: Blackwell.
- Waterson, N. (1971). Child Phonology: A prosodic View. *Journal of Linguistics* 7, 179-211.
- Werker, J., Gilbert, J., Humphry, I. & Tees, R. (1981). Developmental aspects of cross-language speech perception. *Child Development*, 52, 349-355.
- Werker, J.F. & Tees, R.C. (1983). Developmental changes across childhood in the perception of non-native sounds. *Canadian Journal of Psychology* 37, 278-286.
- Werker, J.F. & Tees, R.C. (1984a). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior and Development* 7, 47-63.
- Werker, J. F., & Tees, R. (1984b). Phonemic and phonetic factors in adult cross-language speech perception. *Journal of the Acoustical Society of America*, 75, 1866-1878.
- Westphal, K. (1998). Pilotuntersuchungen zum L2-Erwerb in bilingualen Kindergärten. M.A., Universität Kiel.
- Wode, H. (1977). The L2 acquisition of /r/. *Phonetica* 34, 200-217.
- Wode, H. (1978). The Beginnings of Non-schoolroom L2 Phonological Acquisition. *IRAL* 16, 109-125.
- Wode, H. (1980). Phonology in L2 Acquisition. In: S.W. Felix (ed.), *Second language development*. Tübingen: Narr, 123-136. Reprinted in H. Wode 1983 (ed.), *Papers on language acquisition, language learning and language teaching*. Heidelberg: Groos. 175-187.
- Wode, H. (1981). *Learning a Second Language vol. I: An Integrated View of Language Acquisition*. Tübingen: Narr.
- Wode, H. (1990). Die Entwicklung des sprachlichen Hörens und seine Bedeutung für einen zeitgemäßen Deutschunterricht. *Der Deutschunterricht* V, 19-34.

- Wode, H. (1992). Immersion und bilingualer Unterricht in europäischer Sicht. H. Eichheim (ed.), *Fremdsprachenunterricht, Verstehensunterricht, Wege und Ziele*. München: Rother Druck, 45-73.
- Wode, H. (1988/1993). *Einführung in die Psycholinguistik: Theorien, Methoden, Ergebnisse*, Ismaning. Reprinted as *Psycholinguistik: Eine Einführung in die Lehr- und Lernbarkeit von Sprachen*
- Wode, H. (1994a). Nature and nurture and age in language acquisition: The case of speech perception. *Studies in Second Language Acquisition* 16, 325-345.
- Wode, H., (1994b). Speech perception and the learnability of languages, *International Journal of Applied Linguistics* 2, 143-168.
- Wode, H. (1995a). Speech perception, language acquisition and linguistics: Some mutual implications. In W. Strange (ed.), *Speech perception and linguistic experience: Issues in cross-language research*. Timonium, MD: York Press, 321-347.
- Wode, H., (1995b). *Lernen in der Fremdsprache: Grundzüge von Immersion und bilinguaem Unterricht*. Ismaning: Hueber.
- Wode, H. (1997a). Bilinguale Kindergärten: Wieso, Weshalb, Warum? *Kita* 10, 203-206.
- Wode, H. (1997b). Phonological acquisition and phonological theory: Some issues in learning to talk. GALA volume. Amsterdam & Philadelphia: John Benjamins, p. 17-46.
- Wode, H. (1997c). Where do features, phonemes, and their typology come from? A perception-based approach. In J. Leather & A. James (ed.), *Proceedings of the Third Interational Symposium on the Acquisition of Second-Language Speech, New Sounds 97*. Klagenfurt: University of Klagenfurt, 343-350.
- Wode, H. (1998a). A European perspective on immersion teaching: The German scenario. In J. Arnau & J.M. Artigal (ed.), *Els Programes d'immersió: una Perspectiva Europea - Immersion programmes: a European perspective*. Barcelona: Edicions Universitat de Barcelona, 43-65.
- Wode, H. (1998b). Bilingualer Unterricht - Wie geht's weiter? Festschrift für Hans Hunfeld. In H.E. Piepho & Angelika Kubanek-German (ed.), "I beg to

differ": Beiträge zum sperrigen interkulturellen Nachdenken über eine Welt in Frieden. München: iudicium verlag, 215-231.

Wode, H. (1999). On the perceptual basis of sound systems: The case of VOT. In K. Grünberg, W. Potthoff (ed.), *Ars Philologica: Festschrift Prof. Panzer*. Frankfurt/Main: Peter Lang Verlag, 211-224.

Wode, H. (2000a). Bilinguale Kindergärten als Ergänzung und Weiterentwicklung von bilingualem Unterricht. Paper at the FMF-Kongress Berlin, April 2000.

Wode, H. (2000b). Multilingual education in Europe. What can preschools contribute? Paper at the 5th European Conference on Immersion Programmes - Next door to Multilingualism, Vaasa, Finland, August 2000.

Wode, H. (2000c). Mehrsprachigkeit durch Kindergarten und Grundschulen: Chance oder Risiko? Vortrag, Mulhouse, November 2000 (to appear in the proceedings).